Original Article

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COVID 19 in Hypertensive and Non-Hypertensive Patients: Descriptive Comparative Studies

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ABSTRACT

Background: Corona virus disease 2019 (COVID-19) is respiratory disorder, which is major public health concern. The incidence of COVID-19 is increasing day by day with multiple variants. The infection spread in more than 213 countries with more than 219 million cases reported and 4.5 million deaths recorded till date. The fatality rate of COVID is 4.1% in China, 12.8% in Italy, 10.2% in Spain, 3.9 % in USA, 2.3 % in Germany, 1.09% in India and 2 % in Pakistan. **Objectives:** The purpose of this study to assess the percentage of hypertensive people who got the COVID 19. **Methods:** Patients with confirmed COVID positive who were admitted in hospital or home quarantined from different areas of Punjab province between November 2020 and April 2021 and willing to fill the questionnaire were included in the study. Hospitalized patients were admitted with specific presentation of acute respiratory distress and SARS COV-2 positive. Qualitative data collection was done through questionnaire. Only 200 true positive of COVID-19 patients agreed to fill the questionnaire. All 200 patients included both hypertensive and non-hypertensive histories. **Results:** Hypertensive patients have higher chances contracting COVID 19 infection. In patients with hypertension and COVID-19 morbidity was 2.1%, in which more than 1.5% patients had any underlying diseases. Patients age range from 35.5 years to 70 years. **Conclusion:** hypertension increases the risk of COVID 19 and showed high mortality.

Keywords: Hypertension; COVID; Respiration

INTRODUCTION

Coronavirus disease is a life-threatening respiratory disorder spread around the globe. The chances of COVID 19 in hypertensive patients much higher in comparison to non-hypertensive patients and shows high mortality (Mithal *et al.*, 2021). There are multiple prognostic factors in COVID-19 which causes high morbidity and mortality (Ye *et al*., 2020). It is studied that the underlying cardiovascular problems are majorly responsible for high morbidity and mortality in COVID 19 patients. Although, most of the patients had mild to moderate symptoms such as influenza like condition, fever and fatigues but some patients presents severe respiratory distress ultimately respiratory failure (Ji *et al.*, 2020). Some patients present with multi organ failure and finally death. Several studies have shown that some common co-morbidities such as hypertension, diabetes are responsible for high morbidity and mortality in COVID-19. According to studies, about 25% patients with COVID-19 had at least one or more underlying disorders (Alam *et al.*, 2021). It has been revealed that diabetes, hypertension, cardiovascular disorder and renal disorders are mainly responsible for prevalence of COVID-19 (Singh *et al.*, 2020). Prevalence of COVID 19 infection hypertension patients less than 40% in different geographical areas. Cardiovascular disorders are less than 10% and diabetic patients less than 35% calculated. Multiple researches indicted that in hypertensive patient's angiotensin converting enzyme is responsible for SARS.COV-2 infection (Mahajan & Chandra, 2020). Based on multiple descriptive studies, hypertension is the major underlying disorder that causes multi-organ failure in COVID-19 patients. To assess the gap current studies used to evaluate the probability of COVID-19 in hypertensive patients and the impact of hypertension on the survival of the COVID-19 patients.

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METHODOLOGY

Patients admitted in different hospitals of district Faisalabad Punjab or home quarantined from different areas of Punjab province between November 2020 and April 2021 and willing after signing inform consent to fill the questionnaire were included in the study. Home quarantined patients had confirmed COVID positive reports. Hospitalized patients were admitted with specific presentation of acute respiratory distress and SARS COV-2 positive. Qualitative data collection was done through questionnaire. Questionnaire contains demographic information, sign and symptoms of disease, underlying disorders or diseases, PCR reports, and high-resolution computer tomography (HRCT) scan results for confirmation of COVID 19 to get accuracy in data collection. Comparison of variables was done through quantitative graphical presentation. *t*- test and chi square test was used to evaluate the findings in categorical collected and use of SPS software version 20.

Ethical Approval

Ethical approval was done from hospital ethical research committee in Faisalabad, Pakistan. Ref. No.: IEC/168-22 dated 4th February, 2022.

RESULTS

Total 200 true positive COVID-19 patients agreed to fill the questionnaire. There were 177 patients including both hypertensive and non-hypertensive patients. COVID-19 patient's morbidity was 2.1%, in which more than 1.5% patients had underlying disease. (Table 1 presented the actual number of deaths and recoveries from COVID 19 in hypertensive patients). Patient's age range was 35.5 years to 70 years. The most common symptoms were cough, headache, respiratory distress, low blood saturation, fever, abdominal pain and abnormal chest X-ray and HR-CT in confirm COVID-19 patients. Based on clinical outcomes, there were only 62 (35.02%) patients with history of hypertension. It was found that 35 out of 62 (56.45%) patients admitted in intensive care units while 19 (30%) patients needed ventilator support. Hypertensive patients showed high mortality ratio. Hypertensive patients with co-existing diabetes, renal disorders, smoking and smoking history had higher chances of admission in ICU. Chi square test and t-test represents that hypertensive patients deteriorated more rapidly than non-hypertensive patient (Figure 1). Bar chart shows the morbidity and mortality ratio in hypertensive patients.

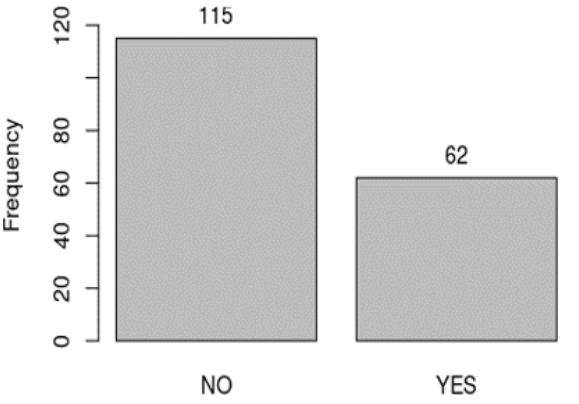

Figure 1: Bar Diagram Showing the Frequency of COVID-19 In Hypertensive and Non-Hypertensive Patients

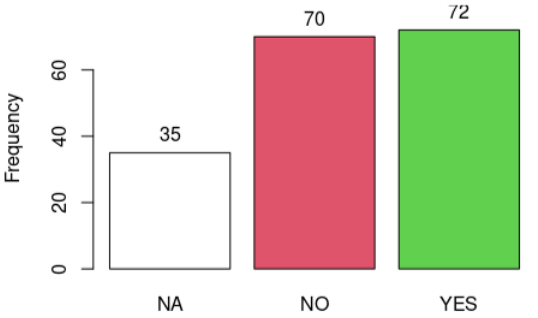

Figure 2: Patients Asymptomatic to Symptomatic Ratio in COVID-19

Table 1: Deaths and Recoveries from COVID 19 in Hypertensive Patients

	COVID-19 Infection	Death	Recovered	Recovery Percentage
Cardiovascular or Hypertension	No (115)	6	109	95%
	Yes (62)	17	45	73%

Table 2: Characteristics of COVID 19 Patients

Demography	
Age	Mean=52
Sex	Male=130 Female=47
Hypertensive male to female ratio	Male=45 Female=17
Patients presented with symptoms	Male=52 Female=20
On ACE INHIBITORS treatment	n= 57

DISCUSSION

World is suffering from crisis of corona virus disease, SARS-COV-2 pandemic. As outbreak started

with multiple clinical symptoms and epidemiological features of the disease appeared. According to researches, it was analyzed that COVID 19 patients with underlying disorders and comorbidities showed higher morbidity and mortality in comparison with general population (Elezkurtaj *et al.*, 2021). Hypertension is major contributing factor in COVID 19 which increases the risk of infection. Hypertensive patients have poor outcome and low survival rate in comparison to non-hypertensive patients. Based on survey conducted in multiple regions of Pakistan, there is total prevalence of hypertension more than 18% in patient's age below 45 years and 33% in patients aged more than 45 years. According to studies, a total number of 62 hypertensive patients were diagnosed with COVID 19 with the prevalence of 35.02% (62/177) which is highest prevalence. It is estimated that about 30% hypertensive patients are infected with COVID 19 around the world.

Although, there is no specific treatment or clinical management of COVID 19 till now, the disease management is almost similar in both hypertensive and non-hypertensive group. But it is clearly indicated that hypertensive patients have higher mortality in comparison with non-hypertensive patients. According to investigation older adults with COVID 19 have hypertensive history while younger population are without any hypertensive history. This causes more complications of disease in hypertensive patients which significantly enhance the mortality rates. Similar results are shown in this studies (Dandachi *et al.*, 2020).

High blood pressure is the highest risk of COVID 19 studied, but blood pressure controlled with medication is also a high probability for Corona virus disease. However, many institutes are already focusing on factors affecting COVID 19 like hypertension, along with diabetes and high blood pressure. Susceptibility to SARS-CoV-2 viral infection are more under such condition. Controlling blood pressure will reduce the burden of disease. The fact is that hypertension and heart disease are major associated factor for Corona virus infection under controlled or uncontrolled conditions. This is due to angiotensin transferring enzyme inhibitors and angiotensin blockers for receptor in the SARS-COV-virus, the binding ability of ACE2 in the lungs and the increased cell penetration of these agents, can either be good or harmful in patients. The treatment procedure for these patients are in relation to their susceptibility to acquiring COVID-19 or the consequences thereof. Researches shows that ACE inhibitors and ARBs increase ACE2, that enhances the activity of COVID 19 into the lungs, the pathological activity leads to damage of the lungs and clinically symptoms appeared. Angiotensin converting enzyme presents a secure pathway for lungs from COVID 19 in experimental research (Gupta *et al.*, 2020).

Yan *et al.*, (2020) studied the risk of high blood pressure and diabetes for COVID 19. The World Health Organization views that patient's cardiovascular disorders and high blood pressure, or polygenic disease be treated with an ACE enzyme. Lung's involvement due to corona virus disease 2019 and there is effect of converting enzyme called ACE inhibitors treatments. Hypertension is considered an important risk factor for the coronavirus disease 2019 (COVID-19). The commonly anti-hypertensive drugs are the renin-angiotensin-aldosterone system (RAAS) inhibitors, calcium channel blockers (CCBs), and beta-blockers (Peng *et al.*, 2021). Hypertension increases COVID-19 severity due to underlying endothelial dysfunctions and coagulopathy. COVID-19 might augment the hypertensive complications due to down-regulation of ACE2. The use of ACEIs or ARBs might be beneficial in the management of hypertensive patients with COVID-19 (Batiha *et al.*, 2021)

Multiple studies found that hypertensive patients along with COVID 19 collapse faster than patients without hypertension (Emami *et al.*, 2021; Huang *et al.*, 2020). Middle East Respiratory Syndrome (MERS) associated with Severe Acute Respiratory Syndrome Corona Virus Disease (SARS-CVO-2) with similar risk factors and presented symptoms. Patients with high blood pressure got MERS 2012 in Kingdom Saudi Arabia. The pathological relationship between hypertension and SARS-COV-2 shows the disease severity and complications. Clinical studies declared that antihypertensive drugs and disease progression showed controversial issues (El Bcheraoui *et al.*, 2014).

On the basis of different studies, it has been showed that angiotensin-converting enzyme 2 (ACE-2) is the associated receptor which makes the direct entry of Coronavirus into the cell. ACE 2 widely expressed in different organs which causes multi organ involvement of COVID 19. The use of ACE 2 inhibitors and Angiotensin Receptor Blockers can increase the expression of binding virus with the cell which makes host susceptibility. Studies indicated that high fatality

rate in patients receiving ACE 2 inhibitors and ARBS treatments at home or hospital (Bourgonje *et al.*, 2020; Ni *et al.*, 2020).

The present suggested that hypertensive patients with co-morbidities like hypertension, cardiovascular disorders need more precautionary measures and early treatment to prevent further progression of disease. Co-morbidities such as HIV, renal failure, ischemic heart disease and other disorders causes crisis in COVID 19 patients. Complete blood count picture presented low lymphocytes in hypertensive groups. ACE-2 inhibitors enhance the risk of COVID 19 in co-morbid patients. Uncertainty still under studies in multiple clinical researches.

The current studies have some limitations. Patients did not have any record of blood pressure previously and medication record for hypertension control. Another resistance faced in data collection was, patients were not willing to fill questionnaire. Mostly patients were unaware of hypertension.

CONCLUSION

This was comparative epidemiological studies, in which susceptibility of COVID-19 in hypertensive patients assessed. The disease severity was most common in patients with hypertension and less common in non-hypertensive patients. COVID-19 infection causes noxious outcomes. The pathogenesis of COVID-19 is highly intricate, with numerous factors involved. Further studies are needed to test the protective effects of ACEIs in COVID-19.

Conflict of Interests

The authors declare that they have no conflict of interests.

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